REMARKS

Claims 1-14 have been canceled, and claims 15-23 are pending in the application.

The Office Action has been carefully considered, along with the references cited, and applicants still believe they have made significant and patentable improvements to the art of couplings for tubular conduits.

In brief review, this application relates to a tubular conduit having improved coupler end portions for use in connecting a plurality of the tubular conduits end-to-end.

With reference to the drawing for this application, the tubular conduit has opposite female and male first and second coupler end portions 12 and 14. As best shown in FIG. 2, the inner surface of the tubular conduit curves outwardly at a transition region 70 to intersect the inner surface 20 of the first coupler end portion 12.

Also as best shown in FIG. 2, a pair of spaced-apart circumferential grooves 28 and 30 are provided in first coupler inner surface 20 adjacent transition region 70. The pair of circumferential grooves include a sealing groove 28 that receives a sealing ring and is located closest to transition region 70. The second groove 30 of the pair is located on the opposite side of sealing groove 28 from transition region 70 and is a locking strap groove for receiving the locking strap of FIG. 3. A slot 54 shown in FIG. 1 and detail B extends through first coupler end portion 12 in alignment with groove 30 for allowing insertion of the locking strap.

As best shown in FIG. 6, male second coupler end portion 14 has an outer surface 34 and an end 74. A circumferential locking strap groove 36 is provided in outer surface 34, and a circumferential outer chamfered end surface 34 is inclined outwardly from end 74 toward outer surface 34. One of the locking strap grooves 30 or 36 is wider than the other to allow insertion

of a locking strap thereinto despite a small amount of misalignment therebetween. Most preferably, the wider locking strap groove is groove 36 in male second coupler end portion 14.

Male second coupler end portion 14 is sized for close reception within female first coupler end portion 12. When a male second coupler end portion 14 on one conduit is fully received within a female first coupler end portion 12 on another conduit, male first coupler end 74 rests against transition region 70. In this position, locking strap grooves 30 and 36 are in alignment with one another so that a locking strap inserted through slot 54 enters both grooves circumferentially thereof for locking two conduits together against separation.

A sealing ring having a generally rectangular cross-sectional configuration is shown in FIGS. 4A-4C. The sealing ring preferably has three lobes on each of its inner and outer circumferential surfaces as generally indicated in FIG. 4C for making good sealing engagement with the bottom of groove 28 and with outer surface 34 on male second coupler end portion 14 between outer chamfered end surface 38 and locking strap groove 36.

With the sealing ring carried by groove 28 within female first coupler end portion 12 and located adjacent transition region 70, male second coupler end portion 14 need slide only a short distance past the sealing ring to engage end 74 with transition region 70 and this facilitates assembly of adjacent coupler end portions. The external chamfered end surface on male second coupler end portion 14 facilitates movement of end 74 past the sealing ring so that the sealing ring will not be displaced from groove 28 and will make good sealing engagement with outer surface 34 of second coupler end portion 14 intermediate locking strap groove 36 and outer chamfered end surface 38.

Various combinations of the original claims were rejected under 35 U.S.C. 102(b) on Carter 3,759,553; Toon 5,255,945; Krayenbuhl et al 3,181,897; Spencer et al 4,396,210; and

Hopperdietzel 5,083,820. The references do not disclose or remotely suggest the novel and advantageous arrangements and relationships now recited in claims 15-23.

Carter has a pair of locking strap grooves 8 in the inner surface of a female first coupler end portion that are aligned with a pair of locking strap grooves 9 in the outer surface of a male second coupler end portion. The Carter arrangement includes a sealing ring groove 6 in the outer surface of the male second coupler end portion that contrasts with the arrangement of the present application wherein the only sealing ring groove is provided in the inner surface of the female first coupler end portion. The arrangement of Carter requires that the sealing ring 7 slide nearly the full length of the joint when a male second end portion is inserted into a female first end portion. Carter's seal 7 also must slide past locking strap grooves 8 in the female coupler when the parts are assembled, and this may cause displacement of the seal ring 7 from its groove 6 or otherwise interfere with assembly.

Toon also has the sealing ring groove in the outer surface of the male second coupler end portion rather than in the inner surface of the female first coupler end portion as claimed in the present application. The locking strap grooves 29 and 30 in Toon also are located remote from the outwardly curved transition zone between the conduit inner surface and the inner surface of the female first coupler end portion rather than being adjacent to the transition region as disclosed and claimed in the present application. Toon's seal 34 also must slide past outer locking strap groove 30 during assembly, and this may cause displacement of the seal ring 34 from its groove 25 or otherwise interfere with assembly of the parts.

Krayenbuhl et al has a special complicated shape on end portions of conduits for locking same together. Krayenbuhl et al does not have an outwardly curved transition zone between an inner surface of a conduit and an inner surface of a female first coupler end portion to define a transition zone. Krayenbuhl et al does not have the advantageous sealing and locking

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arrangement of the present application wherein the sealing ring is received in an internal circumferential sealing groove in the inner surface of the female first coupler end portion for cooperation with the smooth outer surface on the male second coupler end portion.

Spencer et al is similar to Krayenbuhl et al by providing conduit end portions with outwardly flared extensions to form circumferential pockets or keyways for receiving a locking strap. Spencer et al does not have a circumferential sealing groove in the inner surface of a female first coupler end portion adjacent a transition region where the inner surface of a conduit curves outwardly to intersect the inner surface of the female first coupler end portion.

Hopperdietzel does not have the claimed sealing ring that is received in a sealing ring groove adjacent the defined transition region between the conduit inner surface and the inner surface of the female first coupler end portion. Hopperdietzel does not disclose a slot through the wall of a coupling end portion for allowing end-wise insertion of a locking strap into aligned locking strap grooves.

None of the references disclose a circumferential outer chamfered end surface on the male second coupler end portion that is received within the female first coupler end portion. This advantageous chamfered outer end surface adjacent the end of the male second coupler end portion facilitates movement of the male second coupler end past the sealing ring that is received within the circumferential groove in the inner surface of the female first coupling member. None of the references disclose this novel and advantageous arrangement.

No reference discloses or suggests making one of the locking strap grooves wider than the other to facilitate insertion of the locking strap despite some misalignment between the grooves. No reference discloses or suggests the preferred arrangement wherein the wider locking strap groove is on the outer surface of the male second coupler end portion.

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In the absence of more pertinent art, this application is now in condition for allowance and an early notice to that effect is earnestly solicited.

Respectfully submitted,

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